**CELLS**

**Unit Outline**

**Description**

**CELL STRUCTURE AND FUNCTION Pre-AP Seventh Grade Science 2011-2012**

**All living organisms are made of cells. A cell is the smallest unit able to perform life functions. All cells come from pre-existing cells through processes of cell division. When cells divide, the hereditary information they contain, DNA, is passed from cell to cell. All cells, plant and animal, have basically the same composition, and carry out many of the same chemical reactions, although both plants and animals have organelles that are unique. Energy flow occurs within cells allowing life processes to be carried out. Cells may be either prokaryotic or eukaryotic. Prokaryotic cells do not contain a nucleus or many organelles, while eukaryotic cells do. Molecules, including carbohydrates, lipids, proteins, and nucleic acids, enter and exit a cell by osmosis and diffusion. In eukaryotic cells, these molecules join together to form structures within the cell called organelles, each of which is responsible for cellular functions. Important organelles include cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole. Each cell consists of body of jelly-like cytoplasm surrounded by a cell membrane. The organelles are suspended within the cytoplasm. In most multi-cellular organisms, cells associate to form tissues, tissues are arranged into functional structures called organs, coordinated groups of tissues and organs carry out major biological functions and are called organ systems, and organ systems make up the complex multi-cellular organism. Cellular processes can affect the behavior of an organism, such a plant wilting from low turgor pressure, and behavioral changes in both plants and animals resulting from hormonal changes. Emphasis is placed on microscopic observation of different cell types and their unique functions, as well on cells of different sizes. Emphasis is also placed on comparing the cell cycles of different types of cells and on cell differentiation and growth.**

**Connections**

**Cells are the smallest units of life. Many functions that occur inside the cell are similar to functions of larger systems within an organism. In addition, energy transfer as well as physical and chemical changes occur in the living cell as well as in non-living structures. Energy transfer is discussed for nonliving structures in a previous unit. Physical and chemical changes, including the breakdown of larger particles into smaller particles during digestion, will be examined in relation to human body systems in a later unit. Cells are specialized, and may differ in their processes depending on their specific function in the same way that physicians or teachers specialize in a specific area. Parts of a cell are interdependent, and the cell cannot function if all parts are not working properly; a real-world analogy might be that humans could not properly digest food without a stomach, and an animal cell could not digest food particles without lysosomes.**

**Enduring Understandings**

**1.Cells are the smallest unit that can carry out life processes, and only come from other cells. 2.Cells are part of the hierarchical organization of living organisms: cells make up tissues, tissues make up organs; tissues and organs make up organ systems, and organ systems make up organisms.**

**3.Cells may be classified as prokaryotic or eukaryotic and differ in their organelles and**

**reproductive processes.**

**4.Plant and animal cells have similar structures necessary to carry out cellular functions, including cell membrane, nucleus, cytoplasm, mitochondrion, and vacuole.**

**5.Although plant and animal cells have many of the same structures, they have unique**

**differences. Plant cells contain cell walls and chloroplasts, which animal cells do not have, and animal cells contain lysosomes and centrioles, which plant cells do not contain.**

**6.Cellular organelles carry out specific functions for the cell, much like organs carry out specific functions for the organism. For example, the correct disposal of waste is essential for daily life; this also applies at the cellular level.**

**7.Cellular activity transforms energy needed for life processes.**

**8.Materials necessary for production of energy passively enter the cell through processes like diffusion and osmosis.**

**9.Internal cellular processes are sometimes externally visible. For example, when a plant does not have enough water in its vacuoles, turgor pressure drops and the plant wilts, and when plant hormones accumulate, tropisms occur.**

**10. Cells are specialized for specific functions, and therefore have varying cell cycles, appearances, and structures.**

**11. Cellular differentiation must occur in order for a fertilized cell to become a functioning organism. Differentiation is the process that takes place inside an embryo that determines which genes are expressed and hence what type of cell will result.**

**Essential Questions (**[**http://cronodon.com/BioTech/Cell\_structure.html**](http://cronodon.com/BioTech/Cell_structure.html)**)**

**1. How did cell theory develop and who were the major contributors?**

**a. The cell was discovered by** [**Robert Hooke**](http://en.wikipedia.org/wiki/Robert_Hooke) **in 1665. He examined (under a coarse,**

**compound microscope) very thin slices of cork and saw a multitude of tiny pores that he**

**remarked looked like the walled compartments a monk would live in. Because of this**

**association, Robert Hooke called them cells, the name they still bear.**

**b. The first person to make a compound microscope was** [**Zacharias Jansen**](http://en.wikipedia.org/wiki/Sacharias_Jansen)**, while the first to**

**witness a live cell under a microscope was** [**Antonie van Leeuwenhoek**](http://en.wikipedia.org/wiki/Antonie_van_Leeuwenhoek)

**2. What are the components of modern cell theory?**

**a. All living things are made up of one or more cells.**

**b. Cells are the basic living units within organisms. The chemical reactions of life**

**take place within the cells.**

**c. All cells arise from pre-existing cells through the process of cell division.**

**3. Beginning with the cell, how are living things organized?**

**Cells 🡪 tissue 🡪 organs 🡪organ system 🡪 organ system**

**4. What are the internal structures of plant and animal cells, and how are they different?**

**Animal cells do not have a cell wall. Instead of a cell wall, the plasma membrane (usually called**

**cell membrane when discussing animal cells) is the outer boundary of animal cells. Both cell**

**types have vacuoles, however, in animal cells vacuoles are very tiny or absent, while in plant**

**cells vacuoles are generally quite large. Centrioles are generally not found in higher plant cells,**

**while they are found in animal cells. Animal cells do not have plastids, which are common in**

**plant cells (chloroplasts)**

***\*plants have cell walls, animals don’t.***

***\*plants have chloroplasts, animals don’t.***

**\*plant cells divide by building a cell plate. Animal cells divide by forming a cleavage furrow.**

**\*for microtubule production, animal cells have centrioles. Plant cells have MTOCs. microtubule**

**organizing centers**

**Do plant cells contain Lysosomes? It’s debatable but we will say no**

**5. What are the functions of cell organelles?**

**The Nucleus**

* **The nucleus is the control center of the cell and dictates what all of the other organelles do. The nucleus also stores the DNA.**

**Endoplasmic Reticulum**

* **The endoplasmic reticulum is where most chemical reactions take place. The cell makes lipids and other chemicals, and it sometimes has ribosomes attached.**

**Ribosomes**

* **Ribosomes are the only organelle that every cell has, including bacteria. Ribosomes take information from the DNA and use it to make proteins.**

**Golgi Apparatus**

* **The golgi apparatus is essential in packaging different products from the endoplasmic reticulum and the ribosomes into their final form. If a product needs to be sent to other cells, the golgi apparatus packs it and sends it out.**

**Mitochondria**

* **Mitochondria are often referred to as the powerhouses of the cell. Mitochondria take in sugar and create ATP, the type of energy your cells need to function.**

**Plasma Membrane**

* **The plasma membrane, or cell membrane, is not just the covering of the cell. It also plays a vital role in getting nutrients into the cell and sending waste products out.**

[**Chloroplasts**](http://www.sciencegateway.org/resources/biologytext/cb/org/chloroplast.gif)

* **These organelles are the site of** [**photosynthesis**](http://www.sciencegateway.org/resources/biologytext/ps/intro.html) **in plants and other photosynthesizing organisms. They also have a double membrane. There is a more complete description of the chloroplast** [**here**](http://www.mit.edu:8001/afs/athena/course/other/esgbio/www/ps/intro.html#chloroplast)**, in the chapter on photosynthesis.**

**lysosome**

* **This organelle digests waste materials and food within the cell, breaking down molecules into their base components with strong digestive** [**enzymes**](http://www.sciencegateway.org/resources/biologytext/eb/structure.html) **. Here we can see an advantage of the compartmentalization of the eukaryotic cell: the cell could not support such destructive enzymes if they were not contained in a membrane-bound lysosome .**

**Vacuoles - are considered as storage bins of cells**

**6. How is energy transferred during cellular processes?**

**All cells require energy to carry on life processes. The energy comes from chemical bonds stored in the organism’s food. The cell must release the energy by breaking these chemical bonds. When the bonds are broken, heat is released as a by-product, which is how we maintain our body temperature. The process of breaking chemical bonds in food to release heat and energy is called cellular respiration.**

**The most common source of energy is glucose.**

**There are two types of cellular respiration, aerobic and anaerobic. Aerobic respiration requires oxygen and anaerobic respiration, also know as fermentation, does not.**

**Photosynthesis : Photosynthesis is the process by which organisms that contain the pigment chlorophyll convert light energy into chemical energy which can be stored in the molecular bonds of organic molecules (e.g., sugars). Photosynthesis powers almost all trophic chains and food webs on the Earth.**

**7.How are cellular differentiation and cellular specialization related?**

**Cell *specialization* refers to the functions that certain cells have, such as red blood cells are specialized to carry oxygen. Cell *differentiation* is the process that a cell undergoes to acquire that specialization….. we would say stem cells undergo cell differentiation to become red blood cells.**

**8. How do materials necessary for cell functioning enter and exit the cell?**

**The cell's plasma membrane (often referred to as the cell membrane) is essential in the movement of nutrients, oxygen, water, carbon dioxide, and wastes to enter and exit the cell. By allowing the transport of materials, the cell membrane's main job is to maintain homeostasis in the cell. The cell membrane is also essential in providing structure and protection for the cell.**

**The Fluid Mosaic Model is the accepted model of cell membranes. Fluid refers to the phospholipids freely moving about, and mosaic explains the look of the proteins embedded in the phospholipid bilayer.**

**Cell membranes are selectively permeable, that is it allows certain substances (molecules, atoms, or ions) to pass through, and not others. This usually occurs in passive transport when the size or charge prohibits movement across the membrane. Selectively permeable membranes may also play a role in active transport.**

**Passive transport is the most accessible way for things to enter and exit the cell. Passive means that things happen without any energy added. Examples of this type of transport are diffusion and osmosis. Diffusion is the movement of a substance from high concentration to low concentration. This movement is random and occurs with the concentration gradient. Once the concentration gradient has reached equilibrium, equal concentrations of the substance are even throughout the space. Osmosis is the diffusion of water specifically. Movement of water molecules across a membrane can potentially be detrimental to a cell. Osmoregulation is the movement of water in this way. A cell in hypertonic solution has a higher concentration of a substance outside of the cell. If this substance cannot move into the cell to reach equilibrium, the water in the cell will move out to allow equilibrium of the substance. The cell will become shriveled, and may be harder for life processes to occur. A cell in a hypotonic solution has a lower concetration of a substance on the outside of the cell. Water will then rush into the cell to reach equilibrium, when this occurs a cell will become swollen. Plant cells have a strong cell wall that keeps the cell from lysing (breaking), so it becomes stiff/turgid instead. Animal cells do not have this same support and often lyse as a result. Cells in isotonic solution have an equal amount of a substance inside and outside of the cell. Water will still move in and out of the cell, but at equal rates, so no net change occurs. (It is important to note that in hypertonic solutions some water moves into the cell, but far more moves out. The same is true about hypotonic solutions: some water does move out, but much more moves into the cell.)**

**Ion channels (aka channel proteins) are embedded proteins in the membrane that allows ions to diffuse into the cell. Ions cannot normally pass in and out of the cell through the membrane because of the hydrophobic regions of the cell membrane. Ion channels act as a charge-free barrier to allow the diffusion of ions. Facilitated diffusion is another type of passive transport. It also uses no energy, but can move susbtances through a protein much faster than diffusion alone. These proteins are called carrier proteins, and more change the shape of the molecule being moved.**

**Active transport requires energy (mainly ATP). Energy is needed, because a substance is moved against its concentration gradient (i.e. from low concentration to high concentration). One example of active transport is the sodium-potassium pump. This protein pump allows 3Na+ out and 2K+ into a cell for every one ATP molecule that is turned into ADP. This pump balances the ion concentrations inside and outside of a cell, which keeps osmoregulation from occurring and possibly harming the cell. Cystic Fibrosis is a condition in which these Na+/K+ pumps do not function properly, and water moves in and out of cells uncontrolled. This can cause thick mucus (not enough water moving out of cells in the nasal and lung linings) to build up and develop respiratory problems.**

**Endocytosis and Exocytosis are ways for large molecules to enter and exit a cell, respectively. In this case, a cell wraps its membrane around the object and engulfs (or excretes) the substance.**

**Lastly, cell membranes have receptor proteins to allow cell communication. Communicating with neighboring cells is important for unicellular organisms and within multicellular organisms. A specific signal molecule binds to the receptor protein. The signal may change the protein's shape and allow communication, or may signal a second messenger, which sets off a chain reaction to amplify the original signal.**

**9.How do internal cellular processes show externally?**

**(Sweating, breathing hard, redness, temp, etc. etc.)**

**In plants through wilting (turger pressure) tropism**

**10. What makes cell structures interdependent?**

**A nerve cell carries messages from one place to another, so it is long and reaches from place to place and has branching parts on the ends to transfer and receive the messages. A red blood cell must squeeze through tiny capillaries, so it is small and rounded. A cell that needs lots of energy has many mitochondria which break down sugars to make ATPs. A cell that secretes cell products (in the liver, etc.) has many Golgi bodies that sorts and packages the secretions.**

**11. How do cells become specialized for specific tasks within an organism?**

**Cells become specialized to perform different function in multicellular organisms through differentiations. Cellular differentiation is an embryological process by which an unspecialized** [**cell**](http://www.newworldencyclopedia.org/entry/Cell_%28biology%29) **becomes specialized into one of the many cell types that make up the body**

**12. How are cell division processes among organisms alike or different?**

**Mitosis is a type of cellular reproduction where a cell will produce an identical replica of itself with the same number and patterns of** [**genes**](http://en.wikipedia.org/wiki/Genes) **and chromosomes.**

**Meiosis, on the other hand, is a special process in cellular division where cells are created containing gene patterns of different types and combinations with 50% of the number of** [**chromosomes**](http://en.wikipedia.org/wiki/Chromosomes) **of the original cell.**

**Meiosis is used in sexual reproduction of organisms to combine male and female, through the spermazoa and egg, to create a new, singular biological organism. Mitosis is used by single celled organisms to reproduce, or in the organic growth of tissues and fibers.**

**13. How is cellular waste disposal similar to waste disposal of an entire organism?**

**Both take in the materials needed and discard or excrete what is not needed**

**14. Are all cells the same size?**

**No, Some organisms, such as most** [**bacteria**](http://en.wikipedia.org/wiki/Bacteria)**, are** [**unicellular**](http://en.wikipedia.org/wiki/Unicellular) **(consist of a single cell). Other organisms, such as** [**humans**](http://en.wikipedia.org/wiki/Human)**, are** [**multicellular**](http://en.wikipedia.org/wiki/Multicellular)**. Humans have about 100 trillion or 1014 cells; a typical cell size is 10**[**µm**](http://en.wikipedia.org/wiki/Micrometre) **and a typical cell mass is 1**[**nanogram**](http://en.wikipedia.org/wiki/Nanogram)**. The longest human cells are about 135 µm in the** [**anterior horn in the spinal cord**](http://en.wikipedia.org/wiki/Anterior_horn_of_spinal_cord) **while** [**granule cells**](http://en.wikipedia.org/wiki/Granule_cells) **in the** [**cerebellum**](http://en.wikipedia.org/wiki/Cerebellum)**, the smallest, can be some 4 µm and the longest cell can reach from the toe to the lower** [**brain stem**](http://en.wikipedia.org/wiki/Brain_stem) **(**[**Pseudounipolar cells**](http://en.wikipedia.org/wiki/Pseudounipolar_neuron)**). The largest known cells are unfertilised** [**ostrich**](http://en.wikipedia.org/wiki/Ostrich)[**egg cells**](http://en.wikipedia.org/wiki/Ovum)**, which weigh 3.3 pounds**

**Summary**

* **The cell operates as a complete factory with the nucleus as the control center of all cellular activities.**
* **Microscopes enable visualization of cellular organelles. The light microscope gave rise to SEM used for surface details and TEM used for ultrastructural details.**
* **Cell sizes vary. They range from small mammalian blood cells to large avian eggs. Some cells such as nerve cells are long.**
* **Two types of cells are available. Prokaryotes are unicellular organism and Eukaryotes are multicellular. Prokaryotes are believed to be the ancestors of modern day bacteria, which consist of archaebacteria and eubacteria.**
* **Multicellular Eukaryotes are believed to have originated from prokaryotes initially. They become Eukaryotes through the process of endosymbiosis.**
* **Eukaryotic cells contain membrane-bound organelles.  The nucleus is the center of all the cellular activities.  It also synthesizes DNA, RNA and other molecules.**
* **Rough ER synthesizes membrane and secretory proteins vesiculated for transport. Smooth ER synthesizes hormones, phospholipids, stores Ca ions and detoxifies drugs.**
* **Golgi apparatus processes, packages and transports molecules. Lysosomes and Peroxisomes degrade wastes and neutralize hydrogen peroxides as wastes products. Vacuoles are used as a reservoir or receptacle for water and food as well as for waste removal.**
* **Mitochondria make ATP.  Chloroplast contains chlorophyll pigments and also makes ATP using the sun’s energy during photosynthesis.**
* **Plasma membranes selectively transport molecules using active transport, receptor-mediated and facilitated mechanism in addition to diffusion and osmosis.**
* **Endocytosis is a mechanism that allows the cell to take up large molecules.  It consists of phagocytosis and pinocytosis.  After digestion, the process of exocytosis removes particles that remain undigested.**

**The cell uses cilia and flagella as organelles for locomotion.  Cytoskeleton and centrioles function as structural support organelles. Cell wall and cell junctions are channels for intercellular communication.**

**Essential Concepts and Skills**

**By the end of the unit, the student is expected to:**

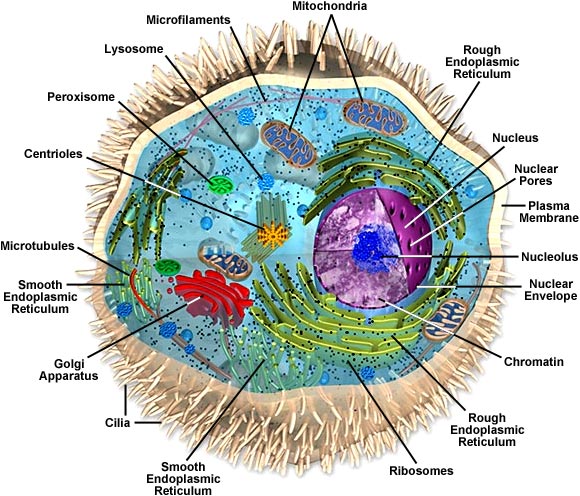
**1.critique early cell theory and explain how it has been improved upon over time**

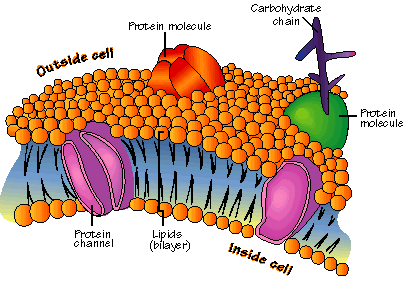
[**http://www.timetoast.com/timelines/23002**](http://www.timetoast.com/timelines/23002)

**2.generate a flow chart showing life organization, beginning with the cell**

**cell,🡪 tissue,🡪 organ,🡪 organ system,🡪organism,**

**3.diagram and describe the function of internal cellular structures, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole**

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**4.compare and contrast how energy is transferred during cellular processes in different organisms like plants, fungi, protists, and animals**

**Just know that we as “animals” use cellular respiration were plants use photosynthesis**

**We get energy from the food we consume**

**Plants get energy from the sun**

**Plants contain chloroplasts for photosynthesis**

**5.based on microscopic evidence, create a scale model showing the relative sizes of molecules, bacteria, animal cells, and viruses.**

**Smallest Molecules (1 nm)**

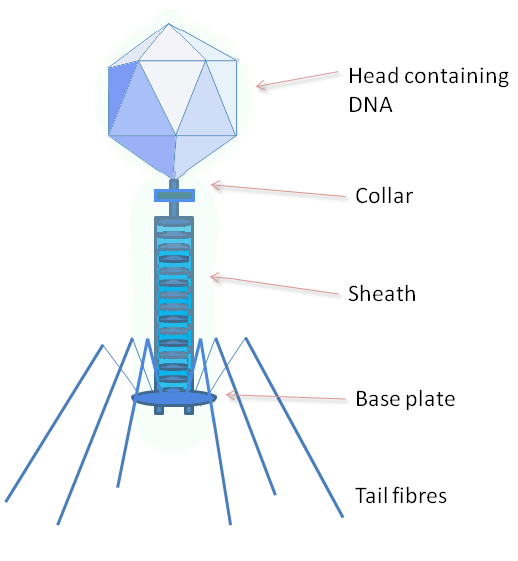
**Cell membrane thickness (10 nm)**

**Viruses (100 nm)**

**Bacteria (1 µm)**

**Organelles (<10 µm)**

**Biggest Most cells (<100 µm)**

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**Be able to ID a virus (above)**

**6.use a microscope to help identify and describe structure and function of amoebae, fungi, plant roots, plant leaves, animal muscle cells, and animal skin.**

[**http://cronodon.com/BioTech/Cells2.html**](http://cronodon.com/BioTech/Cells2.html)

[**http://www.eou.edu/~kantell/images.htm**](http://www.eou.edu/~kantell/images.htm)

[**http://www.udel.edu/biology/Wags/histopage/colorpage/cmu/cmu.htm**](http://www.udel.edu/biology/Wags/histopage/colorpage/cmu/cmu.htm)

[**http://web.jjay.cuny.edu/~acarpi/NSC/13-cells.htm**](http://web.jjay.cuny.edu/~acarpi/NSC/13-cells.htm)

[**http://faculty.clintoncc.suny.edu/faculty/michael.gregory/files/bio%20102/bio%20102%20lectures/fungi/fungi.htm**](http://faculty.clintoncc.suny.edu/faculty/michael.gregory/files/bio%20102/bio%20102%20lectures/fungi/fungi.htm)

**7.explain how cellular differentiation leads to specialized cells**

[**http://www.buzzle.com/articles/cell-differentiation.html**](http://www.buzzle.com/articles/cell-differentiation.html)

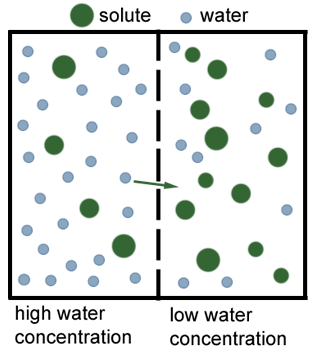
**8.use a microscope to distinguish between different cellular structures, including molecules, bacteria, animal cells, and virus**

**Look at #6**

**9.model diffusion and osmosis**

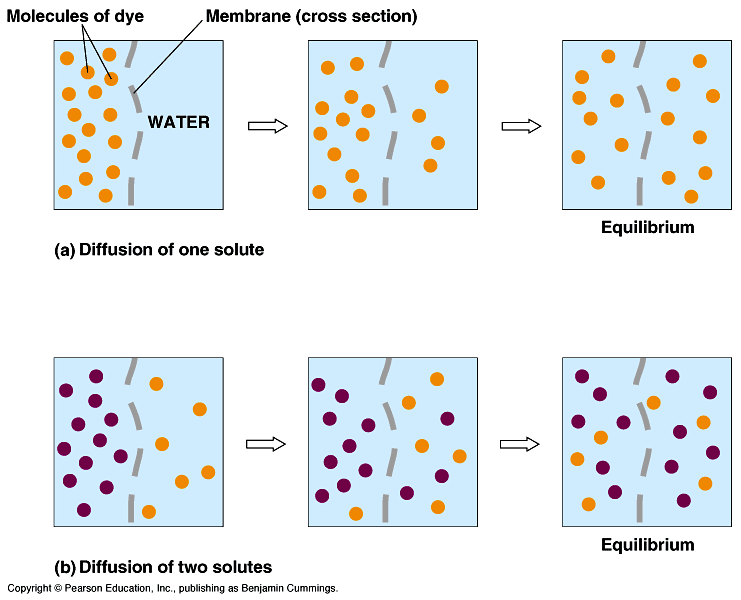
**Osmosis**

**We already know what diffusion is, and osmosis is simply a special type of diffusion, where only some molecules can move because they can pass through a partially permeable membrane:**

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**The left has a high concentration of water and the right a low concentration. By diffusion they will naturally level out and pass through the membrane. The solute, however will not be able to diffuse, as they can't fit through the membrane.**

**Therefore we define osmosis as: the net movement of water from a dilute to a concentrated solution, through a partially permeable membrane.**

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**In diffusion, molecules travel from a higher concentration to a lower concentration. When you put a drop of ink in a glass of water, the spreading of the ink in the water is called diffusion. Similarly, if you spray an air freshener in one corner of a room, eventually people on the other side of the room will be able to smell it as well because the scent has diffused.**

**In osmosis, molecules also travel from higher concentration to a lower concentration. However, osmosis specifically refers to the movement of WATER molecules. Both of these types of transport are examples of passive transport, which requires no energy.**

**10. distinguish between cells that divide, cells that do not divide, and cells that only divide in very special circumstances**

**Cell division is the process by which a *parent*** [***cell***](http://www.absoluteastronomy.com/topics/Cell_(biology)) **divides into two or more *daughter cells*. Cell division is usually a small segment of a larger** [**cell cycle**](http://www.absoluteastronomy.com/topics/Cell_cycle)**. This type of cell division in** [**eukaryote**](http://www.absoluteastronomy.com/topics/Eukaryote)**s is known as** [**mitosis**](http://www.absoluteastronomy.com/topics/Mitosis)**, and leaves the daughter cell capable of dividing again. The corresponding sort of cell division in** [**prokaryote**](http://www.absoluteastronomy.com/topics/Prokaryote)**s is known as binary fission. In another type of cell division present only in eukaryotes, called** [**meiosis**](http://www.absoluteastronomy.com/topics/Meiosis)**, a cell is permanently transformed into a** [**gamete**](http://www.absoluteastronomy.com/topics/Gamete)**and cannot divide again until fertilization. Right before the parent cell splits, it undergoes** [**DNA replication**](http://www.absoluteastronomy.com/topics/DNA_replication)**.**

**11. explain the effects that cellular processes have on varying turgor pressure and accumulation of hormones in a plant**

**Turgor Pressure or turgidity is the main pressure of the** [**cell**](http://www.absoluteastronomy.com/topics/Cell_(biology))**contents against the** [**cell wall**](http://www.absoluteastronomy.com/topics/Cell_wall)**in** [**plant cell**](http://www.absoluteastronomy.com/topics/Plant_cell)**s and bacteria cells, determined by the water content of the** [**vacuole**](http://www.absoluteastronomy.com/topics/Vacuole)**, resulting from** [**osmotic pressure**](http://www.absoluteastronomy.com/topics/Osmotic_pressure)**, i.e. the hydrostatic pressure produced by a solution in a space divided by a** [**semipermeable membrane**](http://www.absoluteastronomy.com/topics/Semipermeable_membrane)**due to a differential in the concentration of solute.**

**This force gives the plant rigidity, and keeps it erect.**

[**http://www.education.com/science-fair/article/determine-rate-geotropism-plant-stems/**](http://www.education.com/science-fair/article/determine-rate-geotropism-plant-stems/)

**12. create an analogy to portray how cell functions are dependent on each other’s success**

**Animal cell functions and organelles are linked to each other. In fact, the collective work of the** [**animal cell parts**](http://www.buzzle.com/articles/animal-cell-parts.html) **is responsible for overall functioning of the cell. Let's take an example of ribosome organelle, which does the main function of protein production. Likewise, mitochondria are centers for releasing energy. And it is because of the lack of cell wall that makes animal cell a more diverse type. Animal cell functions with respect to its specific parts are explained below.**

**http://www.buzzle.com/articles/animal-cell-functions.html**

**13. portray how cellular functions are similar to functions of the larger organism such as waste disposal**

[**http://www.ehow.com/list\_6785572\_organs-rid-wastes-produced-cells\_.html**](http://www.ehow.com/list_6785572_organs-rid-wastes-produced-cells_.html)

**14. compare and contrast the cell cycles, including cell division, of different types of cells, both prokaryotic and eukaryotic, such as fungi cells, cells found in plant leaf, nerve cells, skin cells, muscle cells, and/or plant root cells**

[**http://www.cellsalive.com/cell\_cycle.htm**](http://www.cellsalive.com/cell_cycle.htm)

**What do students typically have as misconceptions?**

**1.Cells are the components of many things including carbohydrates and proteins**

**2.Living things grow because their cells get larger.**

**3.There are only two kinds of cells - plant and animal.**

**4.All cells have nuclei.**

**5.Cells are inside the human body, rather than the human body is itself composed of cells.**

**Preconception Survey**

**1.How do living things grow? Look at cell division**

**2.What do all cells have in common? Look over the organelles**

**3.How are cells related to the human body? They are the body**

**Formative Assessment Items (these are answered above)**

**1.Use a microscope to identify different types of cells and their functions**

**2.Make a flow chart to show the organization of living things from cell to organism**

**3.Diagram, compare, and contrast different types of cells, including at least one single-celled**

**organism**

**4.Sketch a picture of a common cell and its organelles and describe what each organelle**

**does**

**5.Model the difference between diffusion and osmosis**

**6.Illustrate scenarios that are analogous to processes that are carried out within the cell**

**DNA, hereditary, carbohydrates, lipids, proteins, nucleic acids, organelles, cell, tissue, organ, organ system, organism, cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, vacuole, cytoplasm, lysosomes, centrioles, prokaryotic, eukaryotic, turgor pressure, hormone, tropism**

[**http://www.shmoop.com/biology/**](http://www.shmoop.com/biology/)

[**http://www.learnnc.org/search?aphrase=cells&area=learning+materials**](http://www.learnnc.org/search?aphrase=cells&area=learning+materials)

[**http://www.cellsalive.com/**](http://www.cellsalive.com/)

[**http://jc-schools.net/tutorials/tools/science-ms.html**](http://jc-schools.net/tutorials/tools/science-ms.html)

[**http://classroom.jc-schools.net/sci-units/cells.htm#7**](http://classroom.jc-schools.net/sci-units/cells.htm#7)